



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



Publication number: **0 517 647 A3**

**EUROPEAN PATENT APPLICATION**

Application number: **92710014.9**

Int. Cl.<sup>5</sup>: **H01L 29/76, H01L 29/14**

Date of filing: **02.06.92**

Priority: **04.06.91 JP 132712/91**  
**20.06.91 JP 148710/91**

Applicant: **FUJITSU LIMITED**  
**1015, Kamikodanaka Nakahara-ku**  
**Kawasaki-shi Kanagawa 211(JP)**

Date of publication of application:  
**09.12.92 Bulletin 92/50**

Inventor: **Saito, Miyoshi, c/o Fujitsu Limited**  
**1015, Kamikodanaka, Nakahara-ku**  
**Kawasaki-shi, Kanagawa, 211(JP)**  
Inventor: **Mori, Toshihiko, c/o Fujitsu Limited**  
**1015, Kamikodanaka, Nakahara-ku**  
**Kawasaki-shi, Kanagawa, 211(JP)**

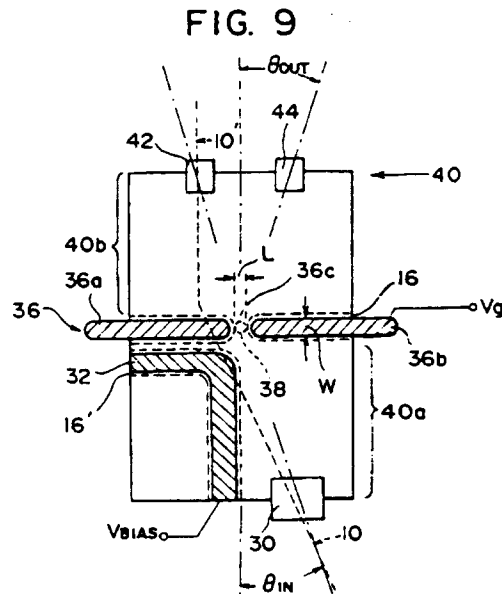
Designated Contracting States:  
**DE FR GB**

Date of deferred publication of the search report:  
**21.07.93 Bulletin 93/29**

Representative: **Seeger, Wolfgang, Dipl.-Phys.**  
**Georg-Hager-Strasse 40**  
**W-8000 München 70 (DE)**

**Quantum semiconductor device that uses a quantum point contact for producing a quantum mechanical carrier wave with directivity.**

A quantum semiconductor device comprises a channel region (40) formed with a two-dimensional carrier gas, a Schottky electrode structure (36) provided on the channel region for creating a depletion region (16) in the channel region to extend in a lateral direction such that the two-dimensional carrier gas is divided into a first region and a second region, a quantum point contact (38) formed in the depletion region to connect the first and second regions of the two-dimensional carrier gas in a longitudinal direction, an emitter electrode (30) provided on the channel region in correspondence to the first region of the two-dimensional carrier gas, one or more collector electrodes (42, 44) provided on the channel region in correspondence to the second region of the two-dimensional carrier gas, and another Schottky electrode structure (32, 34) provided in correspondence to the first region for creating a depletion region therein such that a path of the carriers entering into the quantum point contact is controlled asymmetrical with respect to a hypothetical longitudinal axis that passes through the quantum point contact in the longitudinal direction.



**EP 0 517 647 A3**



European Patent  
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 71 0014

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	PATENT ABSTRACTS OF JAPAN vol. 14, no. 170 (E-913)30 March 1990 & JP-A-20 27 739 ( NTT ) 30 January 1990 * abstract *  -----	1-14	H01L29/76 H01L29/14
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H01L
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	26 MAY 1993	VENDANGE P.	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03.82 (P0401)